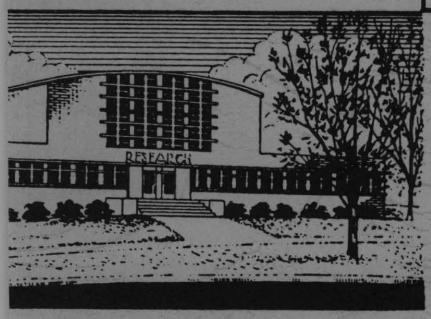
Project A-436-3

MINERAL RESOURCE SURVEY OF CRAWFORD COUNTY, GEORGIA

Prepared for the
Crawford County Board of Commissioners

by
Alfred T. Navarre



Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia

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June 1960

FOREWORD

The present report results from the interest of the Macon Area Development Commission in encouraging counties in its trade area to work jointly toward the assessment of the area's industrial and economic resources. The work--a four-day reconnaissance--was designed to give Crawford County, for the minimum cost, an appraisal of the possible need and desirability of carrying out a more comprehensive survey of the county's mineral resources.

Initiated in conjunction with the Industrial Development Branch's long-range project for the Macon Area Development Commission, the technical work involved was actually done by staff members of the Mineral Engineering Group of the Georgia Tech Engineering Experiment Station's Material Sciences Division.

As noted in the summary and recommendations, the County Commissioners should use these findings to try to interest private firms in doing work such as may be necessary to fully appraise deposits considered worthy of further exploration. The cost of this additional work probably would be quite expensive, and it is recommended that the county not consider undertaking the work itself.

Inquiries concerning the study's findings will be welcomed.

Kenneth C. Wagner, Head
Industrial Development Branch

SUMMARY AND RECOMMENDATIONS

Only two major and two minor resources of economic value were revealed in the County by the reconnaissance. The major resources are kaolin and sand for construction work. It is recommended that a detailed investigation be made of the kaolin outcrop, labelled "K" on the map (see below), since there appears to be a good possibility of developing a kaolin mine there. Specific information as to the thickness of these beds should be obtained by drilling cores to the base of the kaolin zone.

The other major resource is a commercial sand deposit, already under development by the Atlanta Sand Company. Any additional major exploitation of these sand deposits is unlikely.

The two remaining resources are limestone and granite, each of which has only limited economic value. The outcrop area of the limestone (Ocala) is insufficient to support a large operation for any extended period of time, although a small plant might crush this limestone for local agricultural purposes. No areas contain granite of sufficient quality or quantity to be used for other than road metal surfacing material.

The expenditure of additional public funds by the Commissioners is not recommended for the further development of the mineral resources of Crawford County. This report should offer sufficient information to encourage private exploration with the County. It is appropriate that the more detailed work be done by those interested individuals, groups, or firms who stand to gain from the results obtained.

A map, placed in the inside back cover pocket, graphically shows the geological and mineral resources of the County.

MAJOR MINERAL RESOURCES

Kaolin

Kaolin is of prime importance in the areas marked with the symbol "K" on the map (Figure 1). The kaolin is covered with an overburden varying from one foot to 14 feet thick. Much of the kaolin crops out south of Georgia State Highway 42 and seems to occupy a stratigraphic position just below an old covered eroded surface. Various unconsolidated cover materials lie directly above the kaolin beds. In some places these constitute a deep red sandy cover, while in other places the cover is a grey loose sand. This would indicate a bevelling down by erosion to the surface of the kaolin over a considerable length of time.

The kaolin beds are designated as being of Tuscaloosa age, since the overlying formations are stratigraphically of varying younger geologic age. These overlying formations may be the Cusseta, Blufftown, and Eutaw of Eargle.[1/] No single formation of the Upper Cretaceous overlies the kaolin beds.

The kaolin beds seem to occupy a definite zone of deposition by streams at an old shoreline. In some instances kaolin balls, which represent a reworking by wave action and deposition by current cross-bedding of variable steeply dipping sand lenses, verify an erosion cycle along the upward dip of the kaolin zone.

The sand, sand and kaolin, and pure kaolin beds occupy different downdip stratigraphic horizons.

The top of the Tuscaloosa horizon crops out in a deep gully to the southeast of the Ocala limestone in Rich Hill area. The bevelling by an erosion plane of various Upper Cretaceous formations, including the Tuscaloosa, makes it difficult to identify the various formations.

Sand

All outcrops of commercial sand deposits are concentrated in an area to the west of U. S. Highway 341, between Hammett Station and

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1/ Eargle, D. Haye, "Stratigraphy of the Outcropping Cretaceous Rocks of Georgia," U. S. Geological Survey Bulletin 1014 (1955), p.26.

Zenith along the Southern Railway. The Atlanta Sand Company is exploiting the sand in this area for construction purposes. Only limited areas are utilized, since there is so much variability in the bedding and composition at the same level. Current crossbedding is evident everywhere.

In pits of the Atlanta sand, laminated clay in alternating pink and gray layers, composed of an intermixture of kaolin and sand, occur in beds of some six inches thickness and three to four feet in length in juxtaposition horizontally with current crossbedded gray sand. This mode of deposition has been noted above the kaolin beds in an area far to the eastward of the Atlanta sand pits.

Balls of white kaolin, limonite nodules, and fossil wood are also evident everywhere at respective horizontal levels, attesting to the origin and position of these beds along an indented coastline with changing stream positions. The kaolin balls are attributed to erosion bevelling of the updip position of kaolin beds. In the principal sand area, the same phenomena of great variability in deposition and composition is encountered as in the kaolin pits of Twiggs County. In the middle Coastal Plain this variability has been encountered in core depths to 50 feet below surface level.

The sand operations require large volumes of water, since all sand has to be passed through several washings to remove clay, kaolin, wood and other impurities. Sand deposits are designated on the map by the symbol "S."

MINOR MINERAL RESOURCES

Road Material

Rock material used for crushed-stone surfacing of dirt roads is being quarried at two locations (10 and 19, Figure 1). This material is coarse granite, some of it pegmatitic. There are a number of other locations where this material could be quarried, but since none of it is proper mineral composition for concrete aggregate, only two locations are shown on the map.

Limestone

The only surface outcrop of limestone noted is on the south slope of Rich Hill, about three miles east of the fire tower on Highway 42. The limestone, designated as Ocala, of Eocene age, represents a remnant left by erosion of a stratum that once formed the top surface southward down the dip slope. Residue from its decomposition is a gray sand which covers an extensive flat upland surface. The Ocala limestone deposit might be used for agricultural purposes, since it is a fairly soft stone and would crush to an almost powderlike consistency. The extent of the limestone beyond its outcrop underneath the high point at Rich Hill is unknown. No doubt most of it has been dissolved or eroded away. The Ocala is underlain at the Rich Hill outcrop by the Tuscaloosa formation which consists of white kaolinitic sand and crossbedded clayey sand, with an admixture of mica throughout.

GEOLOGY OF CRAWFORD COUNTY[1/]

The Crystalline Belt

The crystalline belt of Crawford County occupies the entire width of the northern part. Along U. S. Highway 80 from Macon to Roberta there are outcrops of gneiss or injection granite at many points. Many zones of shear occur at several points, and at the interval between stations 35 and 36 is a very wide zone of a rather coarse grained granite with an extensive crush zone. Lenses of meta-gabbro invaded by later injection granite, amphibolite and mica-schists occur at many points throughout the crystalline belt. Tight compensation folds in mica-schist occur on U. S. Highway 341 about two miles south of the Monroe-Crawford County line. Considerable compensating displacement over the entire crystalline belt has taken place. A thrust fault (10, Figure 1), and shear zones in phyllite and schist in the northwest sector of the County, plus numerous crush zones in massive pegmatites, parallel banding in gneisses grading into schists, with remnant structures of granite very easily recognizable, are indicative of tectonic movements.

Lenses of meta-gabbro somewhat sheared along the outer border, penetrated by injection granite in fractures, and in one instance the presence of chloritic material caught between fingers of a massive injection granite indicate movement and granitization as being almost contemporaneous in time.

The Coastal Plain

The stratigraphy of the Coastal plain sediments is quite varied due to several causes. First, there are many remnant patches left behind and detached from the same material down the dip slope of the beds. Solution work has taken its toll of calcareous rocks, so that the Ocala limestone exposure is an erosion outlier, detached from its downdip continuance quite some distance to the southward.

The only exposure of Ocala limestone is on the south side of Rich Hill, about one-fourth mile along a fire road which leads to a bluff overlooking the Ocala.

1/ To be accurate, the discussion of the geology must use terms common to the science. A brief glossary is included for the non-geologist, page 7.

The top of the bluff is a deep red sandy soil, undoubtedly a profile of decomposition of some post-Ocala sediment. In the deep gully to the southeast of the Ocala outcrop is a section of the Tuscaloosa, about 30 feet thick as exposed. The formation consists of white crossbedded clayey sand with much muscovite admixed. Below the micaceous white sand (kaolinitic) is a coarse white sand to the bottom of the pit. Most of the good kaolin deposits lie downdip below this horizon.

Several formations of Upper Cretaceous age lie scattered and disconnected over the surface of the Tuscaloosa formation of Crawford County. These are the Providence, Ripley and Cusseta formations, grouped as undifferentiated Cretaceous on the geologic map of Crawford County. The reasons for doing so are: First, as mentioned above, these formations are scattered and disconnected over the Tuscaloosa. Erosion has disrupted the continuity of these formations. Secondly, the reworking of the formations by subsequent wave action has made delineation of time very difficult. There is disagreement among the stratigraphers, who have spent much time studying this area, in correlating the above formations.

The columnar section of Crawford County from the Tertiary downward, including the preCambrian crystallines is as follows:

Tertiary	(Eocene - Ocala limestone	Eoc.
Cretaceous	(Upper Cretaceous undifferentiated	Ku.
	(Upper Cretaceous Tuscaloosa	Kt.
PreCambrian	(Gneiss - biotite-gneiss	bgn.
	(Gneiss - hornblende-gneiss	hgn.
	(Meta-Gabbro	mgb.
	(Pegmatite-injected into various rocks	pg.
	(Schist and phyllite	sch. & phy.

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GLOSSARY

Amphibolite	A dark, coarse-grained rock with lath -like crystals of hornblende.
Biotite	A mica, jet black in appearance.
Chloritic	Dark green, soft, micaceous mineral.
Gneiss	A "striped" rock (igneous or metamorphic) with the bands resulting from concentrations of light and dark colored minerals; often mistakenly called a granite.
Injection-granite	Similar to a gneiss, but with light material predominating.
Meta-gabbro	A dense, very fine-grained, dark colored (nearly black) rock.
Mica-Schist	A rock containing much mica in small crystals (commonly oriented), so that the rock splits easily in one direction.
Muscovite	A mica, so called "white" mica, actual appearance is from silvery to dark brown and green, but distinct from jet black biotite.
Pegmatite	A light-colored igneous rock found in veins and dikes in the gneiss. It has large, but different sized crystals of feldspar, quartz, and mica.
Phyllite	A very fine-grained, buff to light tan, rock.

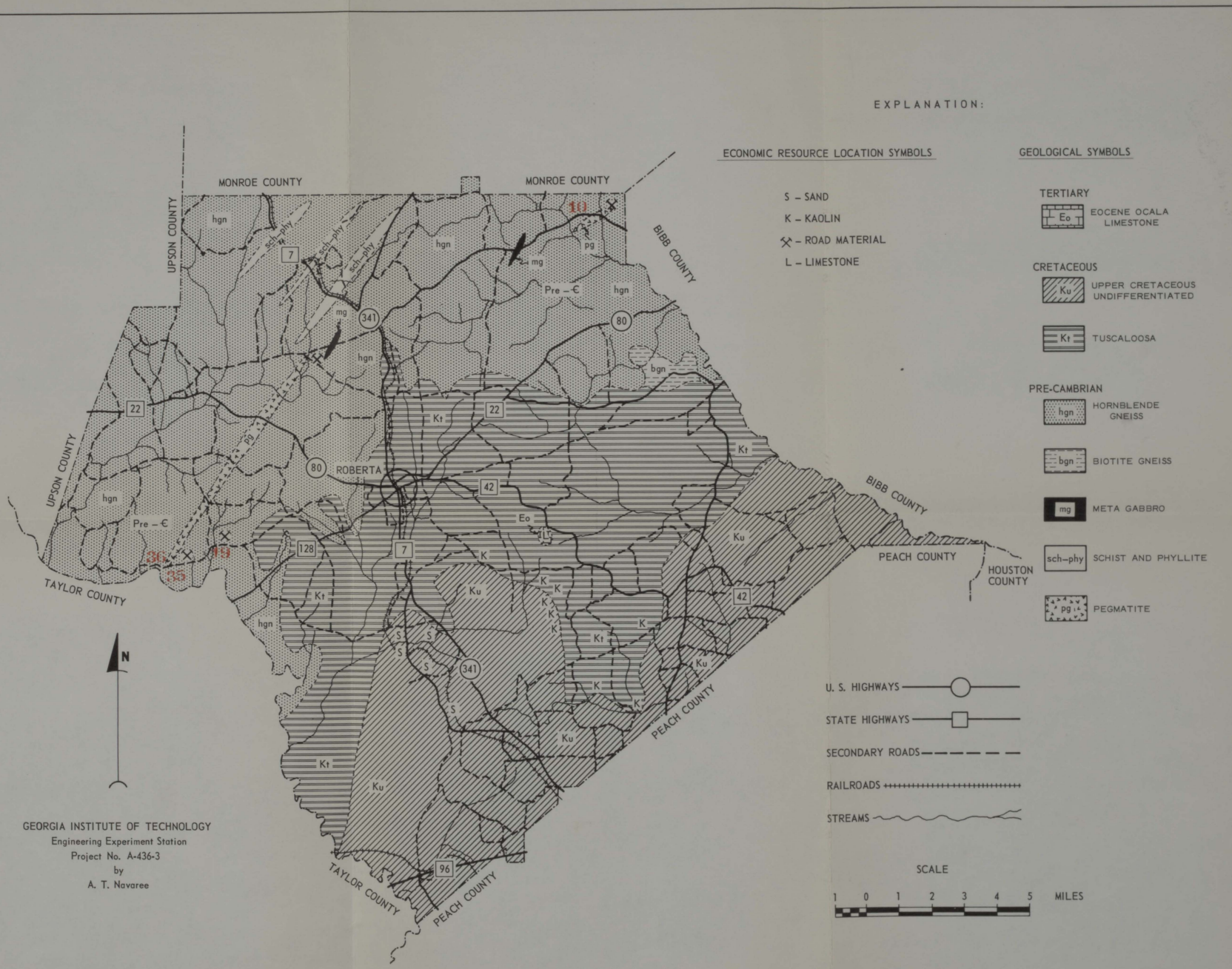

FIG 1: RECONNAISSANCE GEOLOGIC MAP OF CRAWFORD COUNTY, GEORGIA